In the Specification:

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Each impeller 35, 37 comprises two circular plates 43 stacked vertically and having a plurality of vanes 45 attached to and between plates 43. Vanes 45 define separate passages between plates 43. Impellers 35, 37 are attached to and rotate with shaft 23 to draw lubricant into a central portion of impeller 35, 37 and increase the velocity of the lubricant at a discharge at a periphery. In this embodiment, impellers 35, 37 are oriented to discharge lubricant downward, however they could be oriented to discharge upward. Impellers 35, 37 are preferably straight-vane impellers which, while less efficient, would allow bidirectional operation of the pump. Impellers 35, 37 are shown to be a radial-flow type which directs the flow from the passages between the vanes radially outward. Mixed-flow impellers, which direct flow axially as well as radially, may also be employed in some cases. However, mixed-flow stages do not provide as much pressure increase as radial-flow types, instead providing more velocity. A lubricant reservoir [45] 42 of fixed volume of fixed volume is located below impeller 37.

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The increase in pressure in reservoir [44] 42 forces the lubricant to travel up passage 25 where it enters holes 29. The pressure causes the lubricant to flow between bearings 27 and shaft 23 and to form a film in the interface, thus stabilizing bearings 27. The pressure must be maintained above a critical level to ensure the continued stability of bearings 27. Typically, the necessary pressure ranges between 30 and 100 pounds per square inch.

1.(Twice Amended) In an electric motor having a shaft and a bearing located within a housing that is adapted to be filled and sealed with lubricant, the improvement comprising:

[at least one] a plurality of centrifugal lubricant pump [stage] stages located in the housing, each of the pump [stage] stages having an impeller attached to and rotating with the shaft and a mating diffuser for pressurizing the lubricant; and

a flow passage leading from the lubricant pump [stage] stages to the bearing for applying sufficient pressure to the lubricant to induce a film of lubricant between the bearing and the shaft.

2. (Twice Amended) The motor of claim 1, wherein:

the [at least one pump stage further comprises a second pump stage having an impeller and a diffuser mounted in the housing downstream of the first pump stage for further pressurizing the lubricant] pump stages have a combined capacity to produce at least 30 psi of pressure in the lubricant.

3. (Twice Amended) The motor of claim 1, wherein:

each of the [diffuser] diffusers has a plurality of passages that extend downstream and inward to a central intake of one of the impellers [is upstream of the impeller].

4. (Twice Amended) The motor of claim 1, wherein:

[the pump stage is oriented for discharging lubricant in an opposite direction from the bearings] each of the diffusers has a plurality of passages that extend downstream and inward to a central intake of one of the impellers; and

one of the impellers discharges lubricant into a chamber in the housing without flowing through the passages of any of the diffusers .

5. (Twice Amended) The motor of claim 1, wherein:

the impeller of each of the pump [stage] stages has substantially radial flow passages.

6. (Twice Amended) The motor of claim 1, wherein:

a chamber is located in a lower portion of the housing for containing a volume of lubricant, the chamber being fixed in volume;

the shaft is hollow, and the flow passage is within the shaft for communicating fluid from the chamber to the [bearings] bearing; and

the pump [stage discharges] stages discharge downward.

7. (Twice Amended) An electric submersible pump assembly for a well, the assembly comprising:

an electrical motor having a shaft and a bearing located within a housing that is adapted to be filled and sealed with lubricant;

a chamber located in a lower portion of the housing for containing a volume of lubricant;

a flow passage within the shaft leading from the chamber to the bearing;

first and second centrifugal lubricant pump stages, each pump stage located in the chamber of the housing and each having an impeller attached to and rotating with the shaft and a mating diffuser for pressurizing the lubricant; and

a pump exterior of the motor and connected to the shaft for pumping well fluid.

8. (Amended) The assembly of claim 7, wherein:

[the impellers of] the first and second pump stages have [substantially radial flow passages] a combined capacity to pressurize the lubricant to at least 30 psi.

9. (Amended) The assembly of claim 7, wherein:

the pump stages discharge downward into a lubricant reservoir of fixed volume within the chamber [and are located in a lower portion of the housing].

12. (Amended) A method of operating an electric motor having a shaft and a bearing located within a housing that is adapted to be filled and sealed with lubricant, comprising:

mounting at least one centrifugal lubricant pump stage in the housing, the pump stage having an impeller attached to and rotating with the shaft and a mating diffuser for pressurizing the lubricant;

supplying power to the motor to cause the shaft and the impeller to rotate; and

with the pump stage, applying pressure to the lubricant and flowing the lubricant to the bearing at a pressure sufficient to induce a film of lubricant between the shaft and the bearing that prevents the shaft from contacting the bearing.

13. (Amended) The method of claim 12 wherein the pressure of the lubricant is at least [about] 30 pounds per square inch.

New claim:

14. The method of claim 12, wherein the step of mounting at least one centrifugal lubricant pump stage in the housing comprises mounting a plurality of the pump stages within the housing.